

THE SYSTEMATIC POSITION OF *SPHALMA*
QUADRICOLLIS HORN (COLEOPTERA: SALPINGIDAE:
PYTHINI) AS CLARIFIED BY DISCOVERY OF ITS LARVA

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ABSTRACT

The larva of *Sphalma quadricollis* Horn has been collected from black cottonwood logs in East-central California, and determined from reared adults. It is described and illustrated. The presence of well developed mandibular molar areas and the structure of the preanal series of asperities preclude the placement of *Sphalma* within the Melandryidae, where it has resided for some time. Salient anatomical features of the larvae (head, legs, and urogomphal plate) and adult males (mouthparts and genitalia) indicate a close relationship between *Sphalma* and known genera of the salpingid tribe Pythini, thus *Sphalma* is returned to the Salpingidae (Pythini).

Larvae of *Sphalma quadricollis* Horn were collected in the Sierra National Forest in Mariposa County, California at 5000 ft., 11-15 June 1973. They were taken beneath the somewhat loose bark of black cottonwood (*Populus trichocarpa* Torr. & Gray) logs which were scattered along the banks of a stream. All specimens were located on the undersides of the logs, adjacent to the soil.

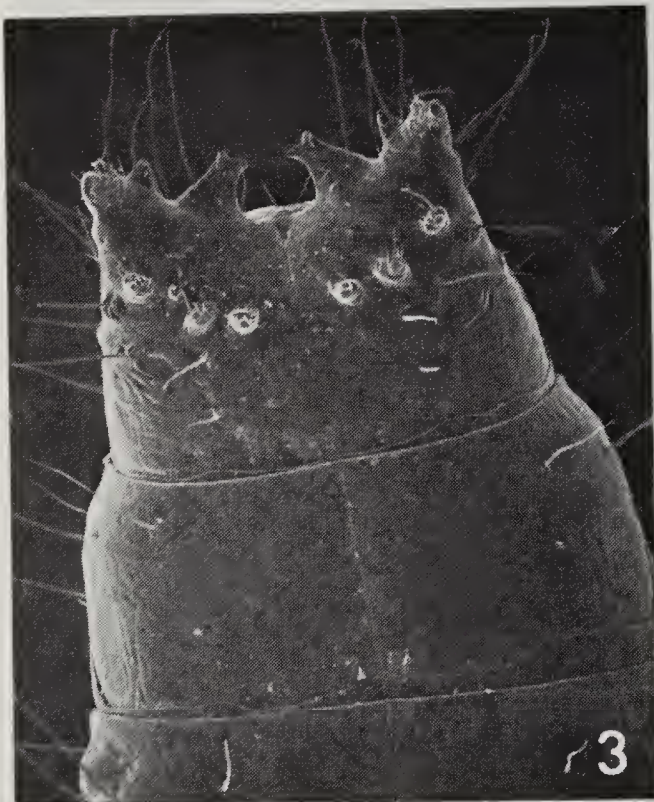
Several larvae were placed in a covered plastic petri dish with small amounts of decayed wood, frass, and soil, and kept at outside temperatures. Pupation ensued within a short time and thus the larvae were determined from reared adults. Several additional adults were taken by sweeping in the grassy meadow surrounding the stream. Confirmation of the determination was made by comparing reared and collected adults with an adult male which was made available by John Lawrence of the Museum of Comparative Zoology.

DESCRIPTION OF LARVA

Mature larvae (Fig. 1) attain lengths of 8.5-9 mm and widths of 1.5-2 mm. Body orthosomatic and subcylindrical, its sides subparallel. Head and body nearly white to light creamy yellow, darker in areas of heavy sclerotization such as mandibles and urogomphal calli; relative lengths (along the meson) of head (from apex of labrum to occiput) to thorax to abdomen approximately 1:3:12. Vestiture sparse, consisting of elongate setae dorsolaterally with shorter setae dorsally and ventrally; tergites of thorax and abdomen with transverse lines or *parabasal ridges* (Young 1975: 9).

Head prognathous, depressed and exerted from prothorax. Epicranial suture lyre-shaped with stem short and indistinct or absent, frontal arms complete to antennal insertions; endocarina absent. Antero-lateral aspects of head apparently with 4-5 ocelli on each side, difficult to distinguish due to lack of pigmentation in preserved specimens; rim of occipital fora-

men slightly reinforced. Antennae prominent, 3-segmented, 2nd segment bearing small supplementary process or sensory appendix; antennae 0.4-0.5X as long as width of head between antennal insertions, relative lengths of antennal segments 5:9:4; sensory appendix 0.2X as long as 3rd segment. Mouthparts retracted with strong, nearly symmetrical mandibles; surfaces of molar regions finely, transversely ridged, mola of right mandible slightly more prominent than that of left; apices of mandibles with 2-3



Figs. 1-4, Larva of *Sphalma quadricollis* Horn: 1, habitus (dorsal view); 2, legs (ventral view); 3, abdominal tergites 8 & 9 (dorsal view); 4, abdominal segments 8-10 (ventral view).

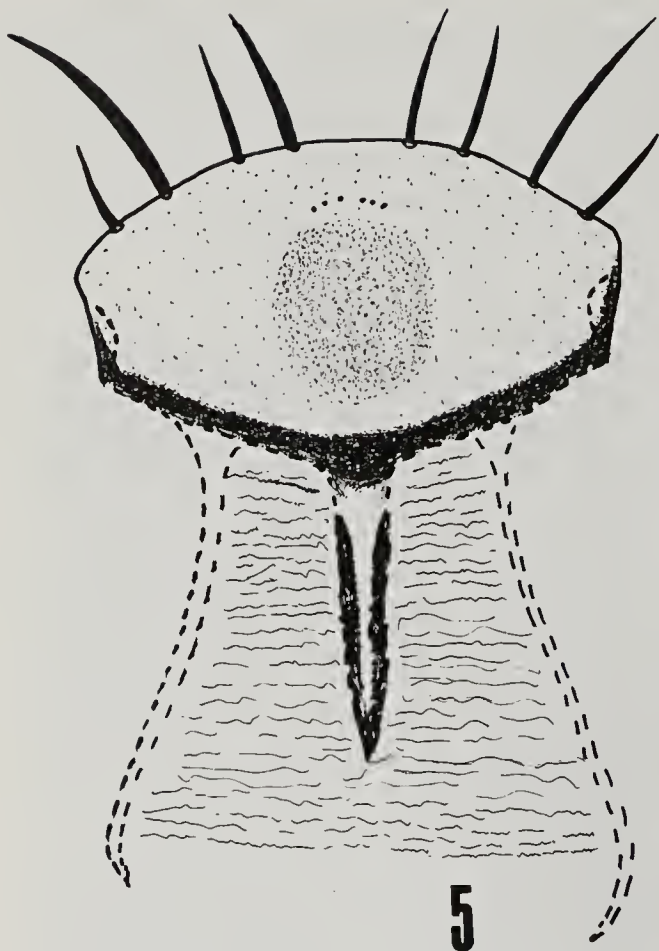
partially interlocking teeth. Labrum symmetrical, located anterad of fused frons and clypeus. Maxillae movable, composed of: 1-segmented cardo, diagonally folded upward toward stipes thus appearing 2-segmented; lightly sclerotized, undivided pad-like maxillary articulating area; maxillary mala; and 3-segmented palpus. Mala shallowly cleft at apex, bearing many stout setae along inner and apical margins as well as 3 heavily sclerotized teeth on inner apical aspect. Labium with ligula short, broadly rounded at apex; palpi 2-segmented. Width of mentum subequal to its length, broadest distally with apical margin shallowly emarginate; submentum trapezoidal, widest proximally; gula transverse, weakly sclerotized. A pair of short ventral epicranial ridges arise laterad of hypostomal margins; hypostomal rods absent. Epipharyngeal form and structure as in Fig. 5; hypopharyngeal sclerome (Fig. 6) well sclerotized with elongate anterior arms.

Thorax with *cervicosternum* (Watt 1970) divided into 3 parts; legs well developed, 0.5X as long as width of mesothorax, consisting of coxa, trochanter, femur, tibia, and terminal tarsungulus, with stout spine-like setae (Fig. 2) on inner surfaces; intercoxal distances (measured relative to coxal diameter) 1.5 diameters (prothorax) and 2-3 diameters (meso- and meta-thorax). Thoracic spiracle (Fig. 7) situated in laterotergite and bearing inconspicuous biforous openings.

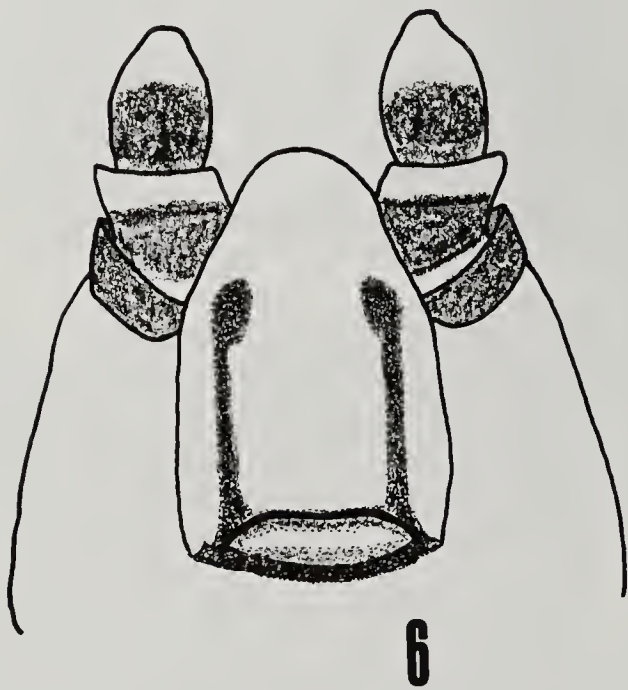
Abdomen depressed to subcylindrical, moderately sclerotized, tergites 1-8 and 9 (excluding urogomphi) subequal in length. Reduced 10th segment located ventrally, laterad and posterad of anus; visible as lightly sclerotized area. Annular-biforous spiracles (Fig. 8) of similar size present on anterior margins of laterotergites 1-8. Ninth tergite (Fig. 3), the *urogomphal plate* (Young 1975: 8) characteristically hinged, bearing paired, heavily sclerotized, fixed, 2-branched urogomphi; inner branch apically bifurcate, outer (main) branch bearing 2 large, stout, inwardly projecting protuberances; main branches curved upward at apices. Distal dorsal surface of urogomphal plate with 3 prominent setiferous calli on each side of meson near bases of urogomphi; *urogomphal pit* (Young, *loc. cit.*) lacking. Ventral aspect of 9th tergite (Fig. 4) divided into several plates, similar in form and structure to those of *Pytho niger* Kirby (Böving & Craighead 1931; pl. 54: M). Ventroanterior margin of 9th sternite (Fig. 4) with asperities in the form of a double arch, each arch formed by 5-7 small teeth, arches separated mesally by a distance subequal to that between adjacent asperities of a single arch; 9th sternite not divided longitudinally. Anal opening ventrad, between fleshy lobes.

SYSTEMATIC POSITION

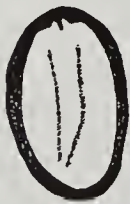
The monotypic heteromerous genus *Sphalma* was described by Horn (1872) from adult specimens collected in California. He referred his new *S. quadricollis* to the family Pythidae and provided a short key to the North American genera. Eleven years later, in their classification of the Coleoptera of North America, LeConte and Horn (1883) placed *Sphalma* in the Pythini of their Pythidae. The relative position of *Sphalma* remained unaltered until 1924 when, in his contribution to the Coleopterorum Catalogus, Csiki included the taxon in the Tetratomini of his Serropalpidae. This change has been reflected in subsequent literature, wherein *Sphalma* is treated as a member of the Tetratominae of Melandryidae (Leng 1927; Hatch 1965; Arnett 1968).



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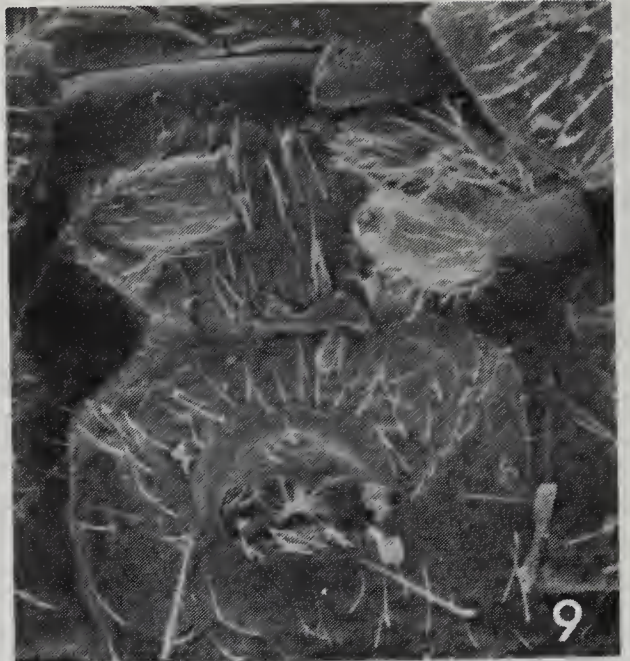
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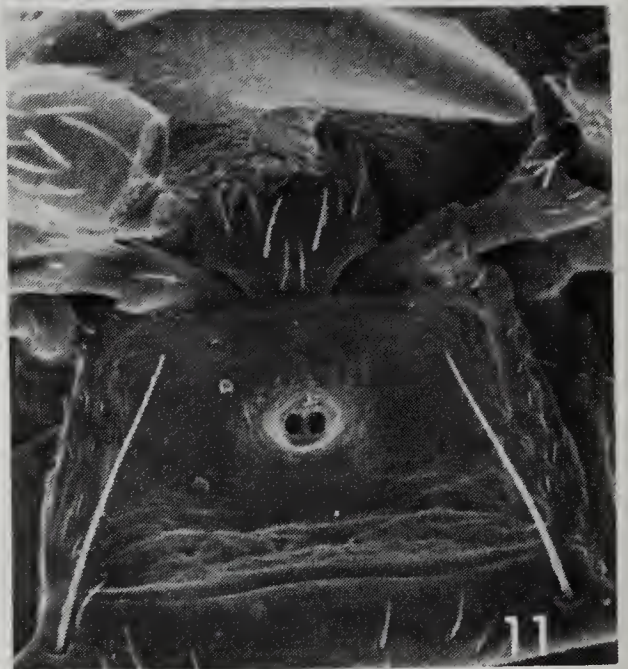
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Figs. 5-8, Larva of *Sphalma quadricollis* Horn: 5, epipharynx; 6, hypopharynx; 7, thoracic spiracle; 8, an abdominal spiracle.

Figs. 9-11, Pits associated with menta of adult male Pythini (all 100X): 9, *S. quadricollis*; 10, *Pytho americanus* Kirby; 11, *Priognathus monilicornis* (Randall).

The presence of well developed molar areas immediately separates *Sphalma* larvae from those of the Melandryidae as defined by de Viedma (1965) with the exception of *Hallomenus binotatus* Quensel and *Mycetoma*, both of which belong to the subfamily Eustrophinae (*sensu* Crowson 1965). *Mycetoma* (de Viedma, *op. cit.*) lacks preanal asperities and *H. binotatus* (Van Emden 1942, 1943; de Viedma, *op. cit.*) has but a single stout asperity on each side of the 9th sternite. Known larvae of the Synchronidae (*sensu* Böving & Craighead 1931, page 41, pl. 52 and Crowson, *op. cit.*) closely resemble those of *Hallomenus* and also have only a single pair of asperities in association with the 9th sternite. Additional diagnostic characters of *Sphalma* larvae include the lack of hypostomal rods, a cervicosternum which is divided into 3 plates, stout spine-like setae associated with the legs, hinged 9th tergite, and asperities in the form of a continuous double arch. Larvae of the Pyrochroidae (Pyrochroinae), Othniidae, and Salpingidae (Salpingini and Pythini) also have hinged 9th tergites. However, the asperities of pyrochroids take the form of a single arch and the legs are devoid of spine-like setae; the asperities of othniids form a double arch which is broadly discontinuous mesally (distance between arches greater than twice that between adjacent asperities of a single arch); both the pyrochroids and othniids have well developed, divergent hypostomal rods. Within the Salpingidae, only the Pythini agree with *Sphalma* in all of the above characters; the salpingine, *Istrisia rufobrunnea* Lewis (Hayashi 1969), comes close to *Sphalma* and the Pythini, but possesses an undivided cervicosternum.

On the basis of the above data, I submit that the current placement of *Sphalma quadricollis* in the Melandryidae is in error and therefore return it to the salpingid tribe Pythini. Further supportive evidence for my position has been brought to my attention by John Lawrence (*in litt.*) who has pointed out that adult males of *Sphalma* possess parameral struts similar to those illustrated for the Salpingidae by Spilman (1952). Also, a setiferous pit on the mentum of adult males is common to *Sphalma* (Fig. 9) and the Pythini (Figs. 10-11).

Hereafter, definitions of adult Salpingidae (Pythini) must be expanded to account for the laterally margined pronotum displayed by *S. quadricollis*. The following alteration to Arnett's (1968, page 26) key to the Tenebrionoidea and other Heteromera (Key F) should circumvent the problem of properly identifying adult *Sphalma*:

- 19(18). Prothorax widened toward base, disc with basal impressions; tarsal claws sometimes cleft or appendiculate; elongate or broadly oval beetles MELANDRYIDAE
- 19' Prothorax narrowed behind and in front; without basal impressions; tarsal claws simple 19A
- 19A(19). Antennae with last 3 segments forming a short, serrate club; mandibles large, porrect; large beetles (over 50 mm.) (TRICTENOTOMIDAE)
- 19A' Antennae subclavate with last 6 segments subequally thickened; mandibles normal; moderate-sized beetles (6-10 mm) (see also couplets 9 & 17) SALPINGIDAE

I should like to acknowledge the Museum of Comparative Zoology for the loan of an adult male *Sphalma quadricollis*, and to express my thanks to the Coleopterists Bulletin reviewers for their time and suggestions and to Mr. Ralph Gorton of Michigan State University who took the scanning electron photographs of the adult Pythini and *Sphalma* mouthparts. A special note of gratitude is extended to John Lawrence for reviewing the manuscript and for his valuable input.

REFERENCES

- ARNETT, R. H. 1968. The beetles of the United States, a manual for identification. Amer. Ent. Inst., Ann Arbor, Michigan, 1112 p; illus.
- BÖVING, A. G. AND F. C. Craighead. 1931. An illustrated synopsis of the principal larval forms of the order Coleoptera. Ent. Americana 11(NS): 1-351, 125 pls.
- CROWSON, R. A. 1965. Observations on the constitution and subfamilies of the family Melandryidae (Coleoptera). Eos 41:507-513.
- CSIKI, E. 1924. Coleopterorum Catalogus, pars 77: Serropalpidae. W. Junk, Berlin, 62 p.
- HATCH, M. H. 1965. The beetles of the Pacific Northwest. Part IV: Macro-dactyles, Palpicornes, and Heteromera. Univ. Washington Publ. Biol. 16:1-268, 28 pls.
- HAYASHI, N. 1969. On the larvae of some species of small families of Cucujoidea in Japan (Coleoptera). Ins. Matsumurana, suppl. 7:1-9, 6 pls.
- HORN, G. H. 1872. Descriptions of some new North American Coleoptera. Trans Amer. Ent. Soc. 4:143-152.
- LECONTE, J. L. & G. H. HORN 1883. Classification of the Coleoptera of North America. Smithsonian Misc. Col. 26:1-567.
- LENG, C. W. 1927. Supplement 1919-1924 (inclusive) to catalogue of the Coleoptera of North America, north of Mexico. Mount Vernon, New York, 78 p.
- SPILMAN, T. J. 1952. The male genitalia of the Nearctic Salpingidae. Coleop. Bull. 6:9-13.
- VAN EMDEN, F. I. 1942. Larvae of British beetles III. Keys to the families. Ent. Monthly Mag. 78:206-226, 253-272.
- _____. 1943. Larvae of British beetles IV. Various small families. Ent. Monthly Mag. 79:209-223, 259-270.
- VIEDMA, M. G. de 1965. Contribución al conocimiento de las larvas de Melandryidae de Europa (Coleoptera). Eos 41:483-506.
- WATT, J. C. 1970. Coleoptera: Perimylopidae of South Georgia. Pac. Ins. Monogr. 23:243-253.
- YOUNG, D. K. 1975. A revision of the family Pyrochroidae (Coleoptera: Heteromera) for North America based on the larvae, pupae, and adults. Contrib. Amer. Ent. Inst. 11(3): 1-39.

